

Total No. of Questions : 8]

SEAT No. :

PD-4075

[Total No. of Pages : 4

[6402]-35

**S.E. (Computer Engg./Comp.Sc.& D.E /AI &
DS, Computer Science & Design Engg.)**

DISCRETE MATHEMATICS

(2019 Pattern) (Semester - III) (210241)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates :

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagram must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data, if necessary.

Q1) a) A committee of 3 persons is to be formed from a group of 2 men and 3 women. In how many ways can this be done? **[6]**

b) Find the number of arrangements that can be made out of the letters.
i) ASSASSINATION ii) GANESHPURI **[6]**

c) What is the number of ways of choosing 4 cards from a pack of 52 playing cards? In how many of these i) are face cards. ii) two are red cards and two are black cards. **[6]**

OR

Q2) a) Out of 4 officers & 10 clerks, a committee of 2 officers & 3 clerks is to be formed. In how many ways committee can be done? **[6]**

i) Any officer & clerk can be included.

ii) A particular clerk must be in committee.

iii) A particular officer cannot be in committee.

b) How many words with or without meaning can be formed using the letters of the word EQUATION using each letter exactly once? **[6]**

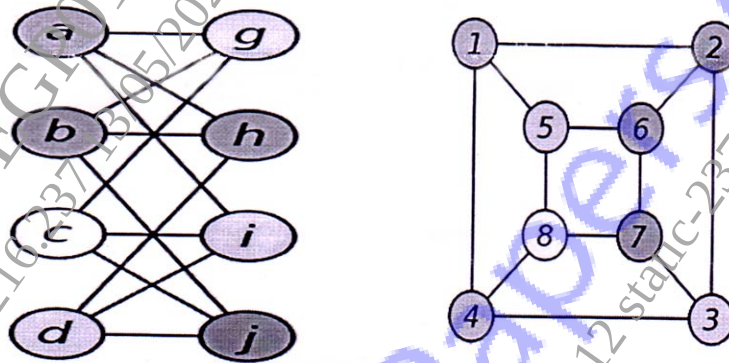
c) Salad is made with combination of one or more eatables, how many different salads can be prepared from onion, carrot, cabbage & cucumber. **[6]**

P.T.O.

Q3) a) Define following terms with example. [7]

- | | |
|---------------------------|------------------------------|
| i) Complete graph | ii) Regular graph |
| iii) Bipartite graph | iv) Complete bipartite graph |
| v) Paths and Circuits | vi) Acyclic Graph |
| iv) Complement of a graph | |

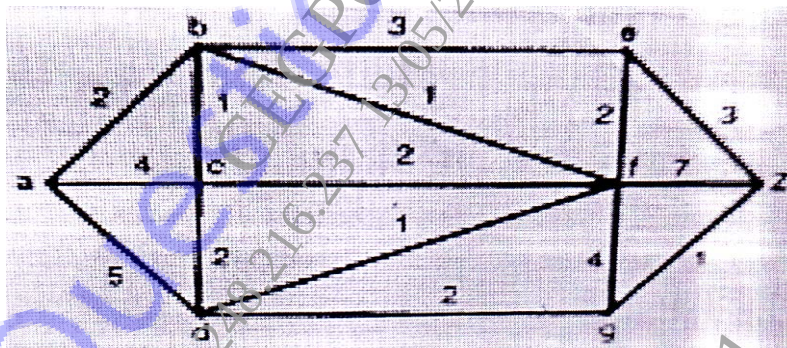
b) The graphs G and H with vertex sets $V(G)$ and $V(H)$, are drawn below. Determine whether or not G and H drawn below are isomorphic. If they are isomorphic, give a function $g: V(G) \rightarrow V(H)$ that defines the isomorphism. If they are not explain why they are not. [5]



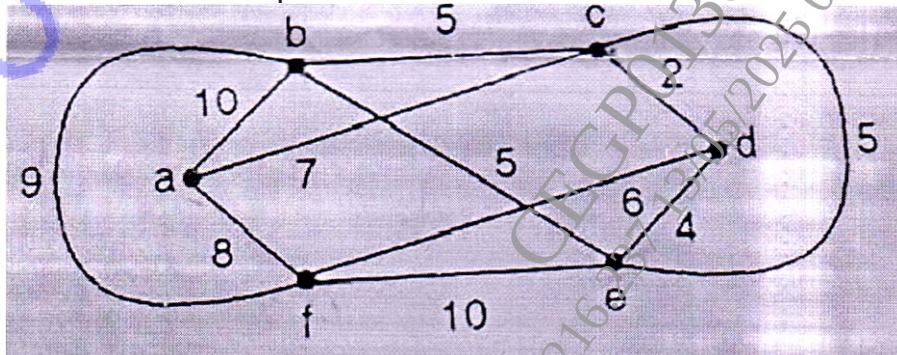
c) Is it possible to draw a simple graph with 4 vertices and 7 edges. Justify? [5]

OR

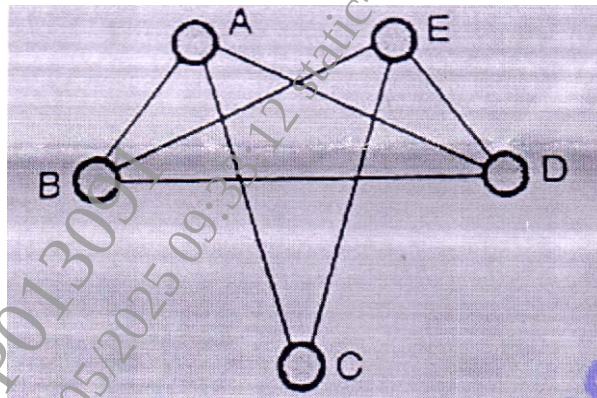
Q4) a) Find the shortest path for a to z in the following graph using Dijkstra's algorithm: [7]



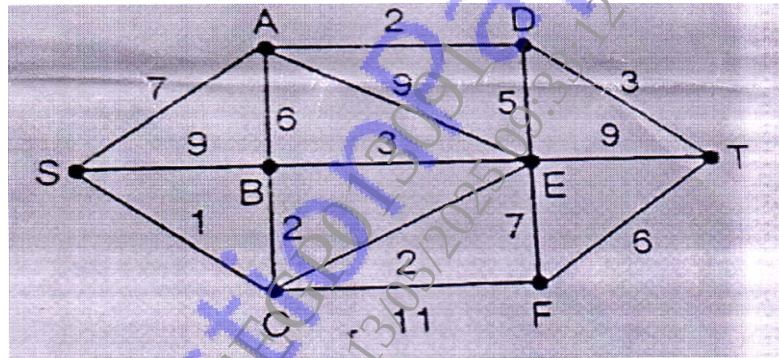
b) For the following graph find whether Eulerian graph and circuit exists. If yes write the Eulerian path and circuit. [5]



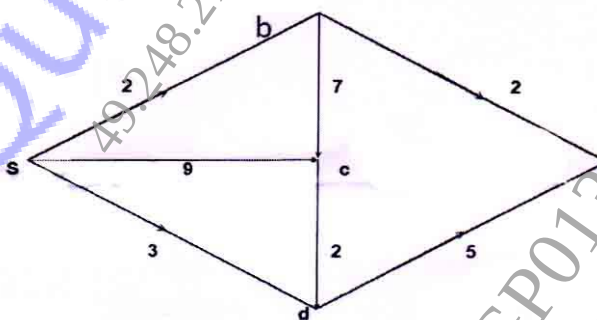
- c) Convert following non planar into planar graph. Also show the validity of Euler's formula for the given graph. [5]



- Q5) a) Construct an optimal binary tree for the set of weights as {8, 9, 10, 11, 13, 15, 22}. Find the weight of an optimal tree. Also assign the prefix codes and write the code words. [6]
 b) Use Kruskal's algorithm to find the minimum spanning tree for the connected weighted graph G as shown in fig. below. [6]



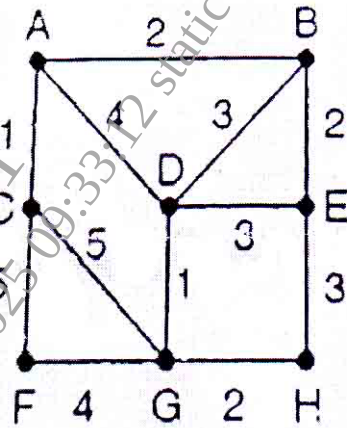
- c) Use labeling procedure to find a maximum flow in the transport network given in the following figure. Determine the corresponding minimum cut. [6]



OR

- Q6) a) Explain [6]
 i) Cut set
 ii) Complete Binary tree
 iii) Prefix code

- b) Use Prim's algorithm to find minimum spanning. Take A as starting vertex (label remaining vertices) [6]



- c) Construct binary search tree by inserting integers in order 50, 15, 62, 5, 20, 58, 91, 3, 8, 37, 60, 24 Find [6]
 i) No of internal nodes ii) Leaf nodes

- Q7) a) Define with examples : [6]
 i) Ring with unity ii) Fields
 iii) Integral Domain

- b) Explain Algebraic system and properties of binary operations. [6]
 c) Consider the set Q of rational numbers and let $a*b$ be the operation defined by $a*b = a + b - ab$ [5]

i) Find $3*4$

ii) $2*(-5)$,

iii) $7*(1/2)$

Is $(Q, *)$ semi group? Is it commutative?

OR

- Q8) a) Define with examples: [6]
 i) Groupoid ii) Monoid
 iii) Abelian group:

- b) Let $R = \{0, 60, 120, 180, 240, 300\}$ and $*$ binary operation so that for a and b in R, $a*b$ is overall angular rotation corresponding to successive rotations by a and by b. Show that $(R, *)$ is a group. [6]

- c) Prove that $(I, +)$ is an abelian group, where I is a set of all integers with respect to binary operation '+'. [5]

